AMENDMENTS TO THE CLAIMS

Listing of the Claims:

1. (Original) An apparatus for creating a pulsating fluid flow, comprising:

an inlet into which fluid flows,

a chamber having an upstream end and a downstream end, wherein the chamber is defined by a pair of outwardly-projecting sidewalls and wherein the inlet is disposed at the upstream end of the chamber,

at least two feedback passages having opposed entrances at the downstream end of the chamber and opposed exits at the upstream end of the chamber near where the chamber joins the inlet,

at least one feedback outlet leaving each of the feedback passages,

a feedback cavity disposed at the downstream end of the chamber, and

at least one exit flowline leaving the at least one feedback outlet, wherein the at least one exit flowline has an exit port.

2. (Original) The apparatus of claim 1, wherein the at least one feedback outlet is substantially perpendicular to a tangent to the feedback passage on which it is disposed, wherein the tangent is taken at the point where the at least one feedback outlet is located.

3. (Original) The apparatus of claim 1 wherein a portion of the at least one exit flowline is substantially perpendicular to the flow of fluid into the inlet.

4. (Original) The apparatus of claim 3 wherein another portion of the at least one exit flowline is parallel to the flow of fluid into the inlet.

5. (Original) The apparatus of claim 1 wherein the entirety of the at least one exit flowline is substantially perpendicular to the flow of fluid into the inlet.

6. (Original) The apparatus of claim 1 wherein a portion of the at least one exit flowline is parallel to the flow of fluid into the inlet.

7. (Original) The apparatus of claim 1 wherein the exit port of the at least one exit flowline is disposed near the upstream end of the chamber.

8. (Original) The apparatus of claim 1 wherein the exit port of the at least one exit flowline is disposed near the downstream end of the chamber.

9. (Original) The apparatus of claim 4, wherein the exit port of the at least one exit flowline is disposed near the upstream end of the chamber.

10. (Original) The apparatus of claim 4, wherein the exit port of the at least one exit flowline is disposed near the downstream end of the chamber.

11. (Original) The apparatus of claim 1, wherein the at least one exit flowline is disposed at an angle to the flow of fluid into the inlet.

12. (Original) The apparatus of claim 11 wherein the angle at which the at least one exit flowline is disposed is determined by the application for which the apparatus for creating pulsating fluid flow will be used.

13. (Withdrawn) The apparatus of claim 1 wherein the exit port of the at least one exit flowline is disposed near the upstream end of the chamber at an angle to a plane containing the chamber.

14. (Withdrawn) The apparatus of claim 1 wherein the exit port of the at least one exit flowline is disposed near the downstream end of the chamber at an angle to a plane containing the chamber.

15. (Withdrawn) The apparatus of claim 1 wherein the exit port of one at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle in front of the plane containing the chamber.

16. (Withdrawn) The apparatus of claim 1 wherein the exit port of one at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle behind the plane containing the chamber.

17. (Withdrawn) The apparatus of claim 15 wherein the exit port of another at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle behind the plane containing the chamber.

18. (Original) The apparatus of claim 1, further comprising at least one fluid outlet leaving the feedback cavity.

19. (Original) The apparatus of claim 18, wherein the at least one fluid outlet is parallel to the flow of fluid into the inlet.

20. (Original) The apparatus of claim 1 wherein the inlet, the chamber, the at least two feedback passages, the at least one feedback outlet, and the feedback cavity are disposed on a mandrel to form a fluidic oscillator insert.

21. (Original) The apparatus of claim 20 further comprising a housing that accommodates the fluidic oscillator insert.

22. (Original) The apparatus of claim 21, wherein the at least one exit flowline is formed in the housing.

23. (Original) The apparatus of claim 21, wherein the housing comprises an opening over the chamber.

24. (Original) The apparatus of claim 1, further comprising:

a second inlet into which fluid flows,

a second chamber having an upstream end and a downstream end, wherein the second chamber is defined by a second pair of outwardly-projecting sidewalls and wherein the second inlet is disposed at the upstream end of the second chamber,

at least two second feedback passages having opposed entrances at the downstream end of the second chamber and opposed exits at the upstream end of the second chamber near where the second chamber joins the second inlet,

at least one second feedback outlet leaving each of the second feedback passages,

a second feedback cavity disposed at the downstream end of the second chamber, and

at least one second exit flowline leaving the at least one second feedback outlet, wherein the at least one exit flowline has an exit port.

25. (Original) The apparatus of claim 24 wherein the inlet, the chamber, the at least two feedback passages, the at least one feedback outlet, and the feedback cavity are disposed on a mandrel to form a fluidic oscillator insert.

26. (Original) The apparatus of claim 25, further comprising a housing that accommodates the fluidic oscillator insert.

27. (Original) The apparatus of claim 26, wherein the at least one exit flowline and at least one second exit flowline are formed in the housing.

28. (Original) The apparatus of claim 26, wherein the second inlet, the second chamber, the at least two second feedback passages, the at least one second feedback outlet, and the second feedback cavity are disposed beneath the chamber on the fluidic oscillator insert.

29. (Original) The apparatus of claim 28, wherein the second fluidic oscillator insert is disposed downstream from the fluidic oscillator insert.

30. (Original) The apparatus of claim 26, wherein the second inlet, the second chamber, the at least two second feedback passages, the at least one second feedback outlet, and the second feedback cavity are disposed on a second mandrel to create a second fluidic oscillator insert.

31. (Original) The apparatus of claim 30, wherein the housing accommodates the fluidic oscillator insert and the second fluidic oscillator insert.

32. (Original) The apparatus of claim 31, further comprising a passageway through which fluid may flow through the fluidic oscillator insert into the second fluidic oscillator insert.

33. (Withdrawn) A method for cleaning a fluid flowline comprising: directing fluid through the apparatus of claim 1 and onto an interior surface of the fluid flowline.

34. (Withdrawn) A method for cleaning a well bore comprising: directing fluid through the apparatus of claim 1 and onto an interior surface of the well bore.

35. (Original) An apparatus for creating a pulsating fluid flow, comprising:

an inlet into which fluid flows,

a chamber having an upstream end and a downstream end, wherein the chamber is defined by a pair of outwardly-projecting sidewalls and wherein the inlet is disposed at the upstream end of the chamber,

at least two feedback passages having opposed entrances at the downstream end of the chamber and opposed exits at the upstream end of the chamber near where the chamber joins the inlet,

a feedback cavity disposed at the downstream end of the chamber, and

at least one exit flowline leaving each of the feedback passages, wherein the at least one exit flowline has an exit port.

36. (Original) The apparatus of claim 35, wherein a portion of the at least one exit flowline is substantially perpendicular to the flow of fluid into the inlet.

37. (Original) The apparatus of claim 36, wherein another portion of the at least one exit flowline is parallel to the flow of fluid into the inlet.

38. (Original) The apparatus of claim 35, wherein the entirety of the at least one exit flowline is substantially perpendicular to the flow of fluid into the inlet.

39. (Original) The apparatus of claim 35, wherein a portion of the at least one exit flowline is parallel to the flow of fluid into the inlet.

40. (Original) The apparatus of claim 35, wherein the exit port of the at least one exit flowline is disposed near the upstream end of the chamber.

41. (Original) The apparatus of claim 35, wherein the exit port of the at least one exit flowline is disposed near the downstream end of the chamber.

42. (Original) The apparatus of claim 37, wherein the exit port of the at least one exit flowline is disposed near the upstream end of the chamber.

43. (Original) The apparatus of claim 37, wherein the exit port of the at least one exit flowline is disposed near the downstream end of the chamber.

44. (Original) The apparatus of claim 35, wherein the at least one exit flowline is disposed at an angle to the flow of fluid into the inlet.

45. (Original) The apparatus of claim 44, wherein the angle at which the at least one exit flowline is disposed is determined by the application for which the apparatus for creating pulsating fluid flow will be used.

46. (Withdrawn) The apparatus of claim 44, wherein the angle at which the at least one exit flowline is disposed is between 10 degrees and 60 degrees.

47. (Withdrawn) The apparatus of claim 44, wherein the angle at which the at least one exit flowline is disposed is between 20 degrees and 45 degrees.

48. (Withdrawn) The apparatus of claim 35, wherein the exit ports of the at least one exit flowlines are disposed near the upstream end of the chamber at an angle to a plane containing the chamber.

49. (Withdrawn) The apparatus of claim 35, wherein the exit ports of the at least one exit flowlines are disposed near the downstream end of the chamber at an angle to a plane containing the chamber.

50. (Withdrawn) The apparatus of claim 35, wherein the exit port of one at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle in front of the plane containing the chamber.

51. (Withdrawn) The apparatus of claim 35, wherein the exit port of one at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle behind the plane containing the chamber.

52. (Withdrawn) The apparatus of claim 50 wherein the exit port of another at least one exit flowline leaving one of the at least two feedback passages is disposed at an angle behind the plane containing the chamber.

53. (Original) The apparatus of claim 35, further comprising at least one fluid outlet leaving the feedback cavity.

54. (Original) The apparatus of claim 53, wherein the at least one fluid outlet is parallel to the flow of fluid into the inlet.

55. (Original) The apparatus of claim 35, further comprising:

a second inlet from the fluid flowline,

a second chamber having an upstream end and a downstream end, wherein the second chamber is defined by a second pair of outwardly-projecting sidewalls and wherein the second inlet is disposed at the upstream end of the second chamber,

at least two second feedback passages having opposed entrances at the downstream end of the second chamber and opposed exits at the upstream end of the second chamber near where the second chamber joins the second inlet,

a second feedback cavity disposed at the downstream end of the second chamber, and

at least one second exit flowline leaving each of the second feedback passages, wherein the at least one second exit flowline has an exit port.

56. (Original) The apparatus of claim 55, wherein the second inlet, the second chamber, the at least two second feedback passages, the second feedback cavity, and the at least one second exit flowline are disposed beneath the chamber.

57. (Original) The apparatus of claim 35, wherein the inlet, the chamber, the at least two feedback passages, the feedback cavity and the at least one exit flowline leaving each of the two feedback passages are disposed on a half mandrel.

58. (Original) The apparatus of claim 57, further comprising:

a second inlet into which fluid flows,

a second chamber having an upstream end and a downstream end, wherein the second chamber is defined by a second pair of outwardly-projecting sidewalls and wherein the second inlet is disposed at the upstream end of the second chamber,

at least two second feedback passages having opposed entrances at the downstream end of the second chamber and opposed exits at the upstream end of the second chamber near where the second chamber joins the second inlet,

a second feedback cavity disposed at the downstream end of the second chamber, and

at least one second exit flowline leaving each of the second feedback passages, wherein the at least one second exit flowline has an exit port.

59. (Original) The apparatus of claim 58, wherein the second inlet, second chamber, the at least two second feedback passages, the second feedback cavity, and the at least one second exit flowline are disposed beneath the chamber on the half mandrel.

60. (Withdrawn) A method for cleaning a fluid flowline comprising: directing fluid through the apparatus of claim 35 and onto an interior surface of the fluid flowline.

61. (Withdrawn) A method for cleaning a well bore comprising: directing fluid through the apparatus of claim 35 and onto an interior surface of the well bore.

62. (Withdrawn) An apparatus for creating a pulsating fluid flow, comprising:

an inlet into which fluid flows, wherein the inlet is disposed between opposed cusps,

an oscillation cavity, wherein the oscillation cavity is defined by a concave rear wall,

two opposed exit flowlines leaving the oscillation cavity near the inlet and the opposed cusps, wherein each of the two opposed exit flowlines has an exit port and wherein the two opposed exit flowlines curve such that a portion of each of the two opposed exit flowlines is substantially perpendicular to the inlet.

63. (Withdrawn) The apparatus of claim 62, further comprising:

a second inlet into which fluid flows, wherein the second inlet is disposed between second opposed cusps,

a second oscillation cavity, wherein the second oscillation cavity is defined by a concave rear wall,

two second opposed exit flowlines leaving the second oscillation cavity near the second inlet and the second opposed cusps, wherein each of the two second opposed exit flowlines has an exit port and wherein the two second opposed exit flowlines curve such that a portion of each of the two second opposed exit flowlines is substantially perpendicular to the second inlet.

64. (Withdrawn) The apparatus of claim 63, wherein the second inlet, the second oscillation cavity and the two second opposed exit flowlines are disposed beneath the oscillation cavity.

65. (Withdrawn) The apparatus of claim 62, wherein the inlet, the oscillation cavity, and the two opposed exit flowlines are disposed on a mandrel to form a fluidic oscillator insert.

66. (Withdrawn) The apparatus of claim 65, further comprising a housing that accommodates the fluidic oscillator insert.

67. (Withdrawn) The apparatus of claim 66, wherein the housing comprises an opening over the chamber.

68. (Withdrawn) The apparatus of claim 66, further comprising:

a second inlet from a fluid flowline, wherein the second inlet is disposed between second opposed cusps,

a second oscillation cavity, wherein the second oscillation cavity is defined by a concave rear wall,

two second opposed exit flowlines leaving the second oscillation cavity near the second inlet and the second opposed cusps, wherein each of the two second opposed exit flowlines has an exit port and wherein the two second opposed exit flowlines curve such that a portion of each of the two second opposed exit flowlines is substantially perpendicular to the second inlet.

69. (Withdrawn) The apparatus of claim 68, wherein the second inlet, the second oscillation cavity and the two second opposed exit flowlines are disposed on the fluidic oscillator insert beneath the oscillation cavity.

70. (Withdrawn) The apparatus of claim 68, wherein the second inlet, the second oscillation cavity and the two second opposed exit flowlines are disposed on a second fluidic oscillator insert.

71. (Withdrawn) The apparatus of claim 70, wherein the housing accommodates the fluidic oscillator insert and the second fluidic oscillator insert.

72. (Withdrawn) A method for cleaning a fluid flowline comprising: directing fluid through the apparatus of claim 62 and onto an interior surface of the fluid flowline.

73. (Withdrawn) A method for cleaning a well bore comprising: directing fluid through the apparatus of claim 62 and onto an interior surface of the well bore.

74. (Withdrawn) An apparatus for creating pulsating fluid flow, comprising:

an inlet into which fluid flows,

a chamber having an upstream end and a downstream end, wherein the chamber is defined by a pair of outwardly-projecting sidewalls and wherein the inlet is disposed at the upstream end of the chamber,

at least two feedback passages having opposed entrances at the downstream end of the chamber and opposed exits at the upstream end of the chamber near where the chamber joins the inlet, and

two exit flowlines leaving the downstream end of the chamber, wherein the two exit flowlines outwardly diverge from the flow of fluid into the inlet.

75. (Withdrawn) The apparatus of claim 74, wherein the two exit flowlines outwardly diverge from the flow of fluid into the inlet at an angle between 10 degrees and 60 degrees.

76. (Withdrawn) The apparatus of claim 74, wherein the two exit flowlines diverge from the flow of fluid into the inlet at an angle between 20 degrees and 45 degrees.

77. (Withdrawn) The apparatus of claim 74, wherein the inlet, the oscillation cavity, and the two opposed exit flowlines are disposed on a mandrel to form a fluidic oscillator insert.

78. (Withdrawn) The apparatus of claim 77, further comprising a housing that accommodates the fluidic oscillator insert.

79. (Withdrawn) The apparatus of claim 78, wherein the housing comprises an opening over the chamber.

80. (Withdrawn) The apparatus of claim 78, further comprising:

a second inlet into which fluid flows,

a second chamber having an upstream end and a downstream end, wherein the second chamber is defined by a second pair of outwardly-projecting sidewalls and wherein the second inlet is disposed at the upstream end of the second chamber,

at least two second feedback passages having opposed entrances at the downstream end of the second chamber and opposed exits at the upstream end of the second chamber near where the second chamber joins the second inlet, and

two second exit flowlines leaving the downstream end of the second chamber, wherein the two second exit flowlines outwardly diverge from the flow of fluid into the inlet.

81. (Withdrawn) The apparatus of claim 80, wherein the two second exit flowlines outwardly diverge from the flow of fluid into the inlet at an angle between 10 degrees and 60 degrees.

82. (Withdrawn) The apparatus of claim 80, wherein the second inlet, the second chamber, the at least two second feedback passages, and the two second exit flowlines are disposed on the fluidic oscillator insert beneath the oscillation cavity.

83. (Withdrawn) The apparatus of claim 80, wherein the second inlet, the second chamber, the at least two second feedback passages, and the two second exit flowlines are disposed on a second fluidic oscillator insert.

84. (Withdrawn) The apparatus of claim 83, wherein the housing accommodates the fluidic oscillator insert and the second fluidic oscillator insert.

85. (Withdrawn) A method for cleaning a fluid flowline comprising: directing fluid through the apparatus of claim 74 and onto an interior surface of the fluid flowline.

86. (Withdrawn) A method for cleaning a well bore comprising: directing fluid through the apparatus of claim 74 and onto an interior surface of the well bore.

87. (Original) A method of creating a pulsating fluid flow, comprising:

injecting a fluid through an inlet from a fluid flowline,

directing the fluid into a chamber,

directing a portion of the fluid through at least two feedback passages that leave the chamber and return to the chamber, forcing the fluid to oscillate inside the chamber,

directing the remaining fluid into a feedback cavity,

redirecting the remaining fluid from the feedback cavity to the chamber to strengthen the fluid's oscillation,

directing the fluid through at least one feedback outlet leaving each of the feedback passages, and

discharging the fluid through at least one exit flowline leaving the at least one feedback outlet to form a pulsating jet.

88. (Original) A method of creating a pulsating fluid flow, comprising:

injecting a fluid through an inlet from a fluid flowline,

directing the fluid into a chamber having an upstream end and a downstream end, wherein the chamber is defined by a pair of outwardly-projecting sidewalls and wherein the inlet is disposed at the upstream end of the chamber,

directing a portion of the fluid through at least two feedback passages having opposed entrances at the downstream end of the chamber and opposed exits at the upstream end of the chamber near where the chamber joins the inlet,

directing the remaining fluid into a feedback cavity disposed at the downstream end of the chamber,

redirecting the remaining fluid from the feedback cavity disposed at the downstream end of the chamber back to the chamber to strengthen the fluid's oscillation,

directing the fluid through at least one feedback outlet leaving each of the feedback passages, and

discharging the fluid through at least one exit flowline leaving the at least one feedback outlet, wherein the at least one exit flowline has an exit port, to form a pulsating jet at the exit port.

89. (Withdrawn) A method for manufacture of an apparatus for creating pulsating fluid flow, comprising:

forming a flowpath for creating pulsating fluid flow on a mandrel to create a fluidic oscillator insert,

forming a housing for the fluidic oscillator insert, and

inserting the fluidic oscillator insert into the housing to form the apparatus for creating pulsating fluid flow.

90. (Withdrawn) The method of claim 89, further comprising: forming a second flowpath on the mandrel for creating pulsating fluid flow on the mandrel.

91. (Withdrawn) The method of claim 89, wherein the housing is a cylinder having a hollow interior section shaped to fit the fluidic oscillator insert.

92. (Withdrawn) The method of claim 89, further comprising: joining the fluidic oscillator insert to the housing.

93. (Withdrawn) The method of claim 92, wherein joining the fluidic oscillator insert to the housing is accomplished by press fitting such that the fluidic oscillator insert and housing are held together by friction.

94. (Withdrawn) The method of claim 92, wherein joining the fluidic oscillator insert to the housing is accomplished by welding.

95. (Withdrawn) The method of claim 92, wherein joining the fluidic oscillator insert to the housing is accomplished by cementing.

96. (Withdrawn) The method of claim 92, wherein joining the fluidic oscillator insert to the housing is accomplished by inserting one or more threaded members into the housing and the fluidic oscillator insert.

97. (Withdrawn) The method of claim 89, further comprising forming the mandrel using a lathe.

98. (Withdrawn) The method of claim 97, wherein forming the mandrel using a lathe is accomplished by casting.

99. (Withdrawn) The method of claim 98, wherein forming a flowpath for creating pulsating fluid flow in the mandrel to create the fluidic oscillator insert is accomplished by casting.

100. (Withdrawn) The method of claim 89, wherein forming a flowpath for creating pulsating fluid flow in the mandrel to create the fluidic oscillator insert is accomplished by milling.

101. (Withdrawn) The method of claim 89, wherein forming a flowpath for creating pulsating fluid flow in the fluidic oscillator insert is accomplished by:

machining an inlet from a fluid flowline,

machining a chamber having an upstream end and a downstream end, wherein the chamber is defined by a pair of outwardly-projecting sidewalls and wherein the inlet is disposed at the upstream end of the chamber,

machining at least two feedback passages having opposed entrances at the downstream end of the chamber and opposed exits at the upstream end of the chamber near where the chamber joins the inlet,

machining a feedback cavity disposed at the downstream end of the chamber,

machining at least one feedback outlet leaving each feedback passage, and

machining at least one exit flowline leaving the at least one feedback outlet, wherein the at least one exit flowline has an exit port.

102. (Withdrawn) The method of claim 90, wherein forming a second flowpath is accomplished by:

machining a second inlet from the fluid flowline,

machining a second chamber having an upstream end and a downstream end, wherein the second chamber is defined by a pair of outwardly-projecting sidewalls and wherein the second inlet is disposed at the upstream end of the second chamber,

machining at least two second feedback passages having opposed entrances at the downstream end of the second chamber and opposed exits at the upstream end of the second chamber near where the second chamber joins the second inlet,

machining at least one second feedback outlet leaving each second feedback passage,

machining a second feedback cavity disposed at the downstream end of the second chamber, and

machining at least one second exit flowline leaving the at least one second feedback outlet, wherein the at least one second exit flowline has an exit port.